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I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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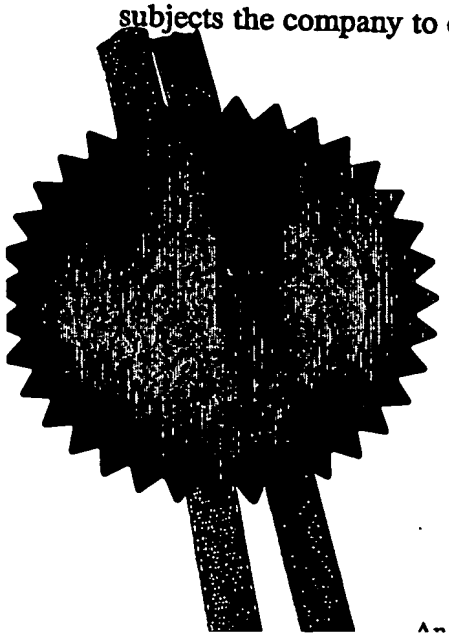
Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed P. Mahoney

Dated 3 August 2004

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Patents Form 1/77

Patents Act 1977
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THE PATENT OFFICE
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NEWPORT

18FEB04 E874080-1 B21655
P01/7700 0.00-0403513.5 NONE

The Patent Office

Cardiff Road
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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

2. Patent application number
(The Patent Office will fill this part in) 0403513.5

18 FEB 2004

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

RADIATION WATCH LTD.,
GREENHILLS,
HAVENSTREET, IOW. PO33 4DT

Patents ADP number *(if you know it)* 8812174001

If the applicant is a corporate body, give the country/state of its incorporation UNITED KINGDOM

4. Title of the invention

DIRECT DEPOSITION RADIATION DETECTORS BY COLLOIDAL SUSPENSION ONTO AN ASIC SUBSTRATE.

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

~~THE PATENT MANAGER~~
~~RADIATION WATCH LTD,~~
~~GREENHILLS~~
~~HAVENSTREET~~
~~IOW PO33 4DT~~

Mintz Levin Cohn Ferris Glovsky + Popeo IP LLP
The Rectory
9 Ironmonger-La
London
EC2V 8E

51/77
29/6/4
PM

Patents ADP number *(if you know it)*

6. Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months.

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute (see note f)

Number of earlier UK application	Date of filing *(day / month / year)*

8. Is a Patents Form 7/77 (Statement of inventorship and of right to grant of a patent) required in support of this request?

Answer YES if:

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.

Otherwise answer NO (See note d)

Patents Form 1/77

Accompanying documents: A patent application must include a description of the invention. Not counting duplicates, please enter the number of pages of each item accompanying this form:

Continuation sheets of this form	
Description	1
Claim(s)	2
Abstract	—
Drawing(s)	3 only

10. **If you are also filing any of the following, state how many against each item.**

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent (Patents Form 7/77)	
Request for a preliminary examination and search (Patents Form 9/77)	
Request for a substantive examination (Patents Form 10/77)	
Any other documents (please specify)	abstract included on page 01 Description

11. **I/We request the grant of a patent on the basis of this application.**

Signature(s) M. Anderson Date Feb. 13th 200

12. **Name, daytime telephone number and e-mail address, if any, of person to contact in the United Kingdom**

M. ANDERSON 01983 885163.
mike.anderson@radiationwatch.co.u

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered YES in part 8, a Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) Part 7 should only be completed when a divisional application is being made under section 15(4), or when an application is being made under section 8(3), 12(6) or 37(4) following an entitlement dispute. By completing part 7 you are requesting that this application takes the same filing date as an earlier UK application. If you want the new application to have the same priority date(s) as the earlier UK application, you should also complete part 6 with the priority details.

Patent Application
Confidential

Benson et al

Description: A direct deposition methodology using liquefaction of a solid material (TlBr or similar detector material) for the production of radiation sensitive detectors to allow for imaging and real time monitoring and historic recording of individual doses of specified radiation:

Abstract

A direct deposition of TlBr or similar detector material is made via the liquefaction and re-crystallisation of TlBr or similar detector material onto a pixelated multiplex CMOS ASIC. The CMOS wafer is pixelated using TiW and Pt metalisation or other such metals. Each contact area/ pixel is surrounded by a dry etch (using ICP or similar process) columns of PECVD oxide are used to ensure isolation and pixel collimation. The application of a wide band gap and low leakage current permits the device to work in a low-noise operation at and above room temp. Further processing using heat techniques gives enhanced properties. The process uses an annealing process via a heat ramp once the detector material is deposited to allow water and impurities to be removed and for the pure detector material to melt. The melting point is relatively low and melts congruently and has no destructive phase transition between solidification and room temperature. The excess detector material is CMP down to the oxide columns with tubs of detector crystal. The low melting point makes process for annealing allows compatibility with the CMOS fabrication process.

Inventors: **Benson Iain**
Morgan Russel

Assignment: RADIATION WATCH LTD.
Application #
Art Work Date Jan 5th 2003
Filing Date

Claims:

1). A process to produce a semiconductor crystal based detector to register radiation for monitoring, imaging and other applications. The detector crystal being directly deposited onto a semiconductor signal and data processing circuit comprising of a CMOS or similar ASIC.

2) The crystal and processing circuit in claim 1). being a hybrid semiconductor device for monitoring and measuring radiation.

3). The structure of the hybrid in claim 2 using an array of delineated recording cells such device comprising a detector substrate or substrates according to the ionizing radiation to monitored or measured. The detector substrate divided into an array of detecting areas or cells – hexagonal, octagonal or rectangular in shape which directly records an ionizing interaction through charge generation. The detector substrate is directly connected to a semiconductor recording or readout circuit; the said circuit have a corresponding cell type structure. Thus the combination of the detection layer and recording layer forms a unique record of an interaction of ionising radiation and an area on/in the device.

The readout/recording cell comprises of a circuit to each measure accumulated charge or photon activity directly resulting from the interaction of ionising radiation within the defined "detector cell". This can be further be recorded by energy of interaction using a threshold level detector circuit and by banding said circuits in either stripes, blocks or cell groupings and having ascending or descending layered steps,

The recording circuit furthermore contains electronic circuits to control and manage the readout to an external circuit the count or accumulated charge associated with the monitoring and measurement. The organisation of the detecting structure and associated electronic circuits is such that the circuit design will be sufficient to record transient high energy peaks without saturating.

4) The process of manufacturing hybrid detector surface as described in claim 3). Will use direct deposition of TlBr or similar substance from a re-crystallisation process

5). The CMOS or similar recording surface as claimed in 3). Will be pixelated using a TiW and Pt or similar metal system described in claim 3). Figs A thru D

6). Each defined detection area in claimed in 3). will be surrounded by a dry etched area. Fig E

7). The dry etched area claimed in 6). will be made using an ICP based or similar process.

8). The dry etch area claimed in 7). will be formed of a PECVD oxide to ensure isolation and columnation of each pixelated detection area. Figs F to J

9). It is further claimed that device will be a low noise device, able to operate at room temperature.

10). It is claimed that the properties claimed in 9). will have been caused by a low temperature related annealing process. Fig K

11). The annealing process claimed in 10). will use a ramp process.

12). The process claimed in 11). will cause materials such as water and impurities to evaporate resulting in a purer deposition of detector material.

13). It is further claimed that the process claimed in 10). through 12). will allow a relatively low melt point.

14) It is claimed that the result of claim 13). will result in a non destructive phase transition between liquid state and solidification at room temperature.

15). It is further claimed that the structure will consist of CMP detector material down to the oxide columns integrated with tubs active tubs of detector. Fig L

16) A conductive layer of Al, Pt, Au or In or other suitable material is deposited by sputtering, PVD or evaporation to allow a bias connection to all pixelated cells. Fig M

17). It is further claimed that the low temperature annealing process will result in a detector and signal and data processing circuit compatible with a CMOS or similar semiconductor manufacturing process.

Drawings:

Fig. A

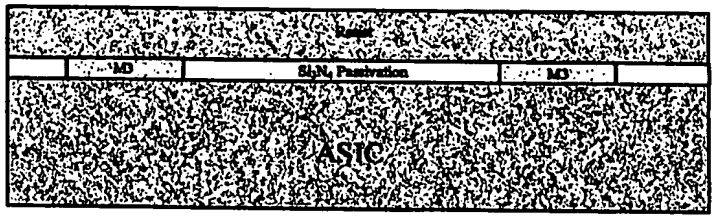

Fig. B

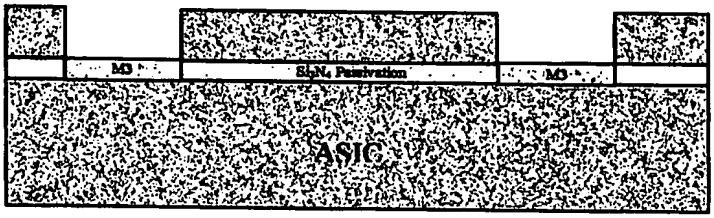

Fig. C

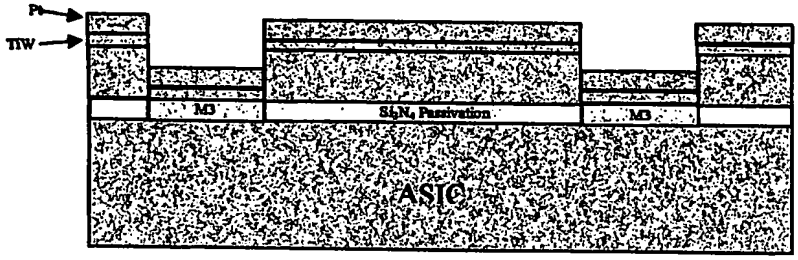

Fig. D

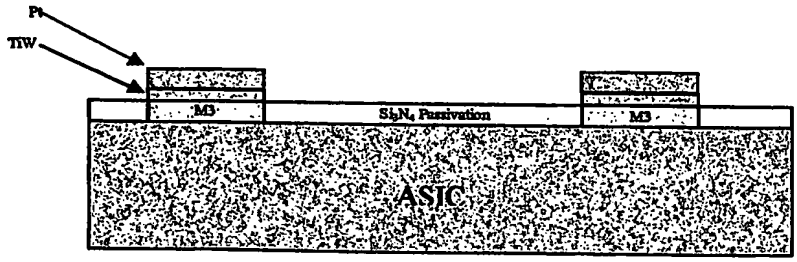

Fig. E

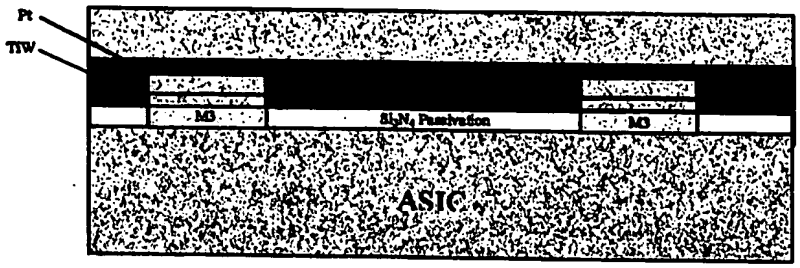

Fig. F

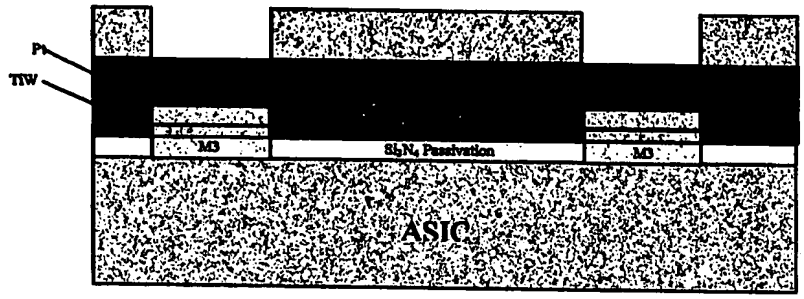

Fig. G

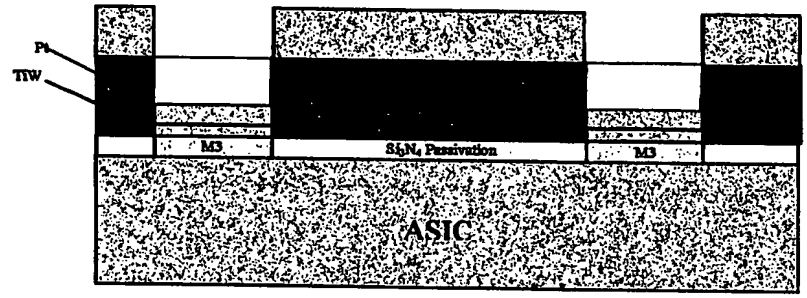

Fig. H

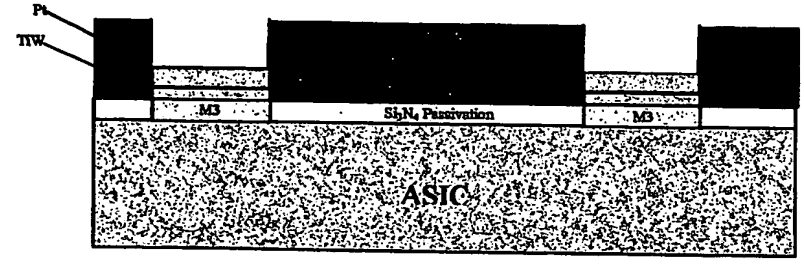

Fig. J

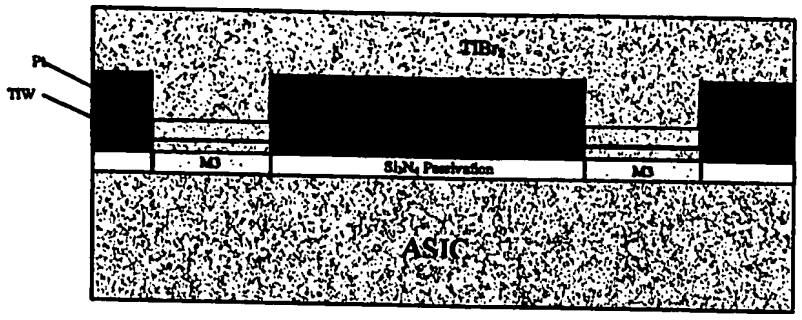

Fig. K

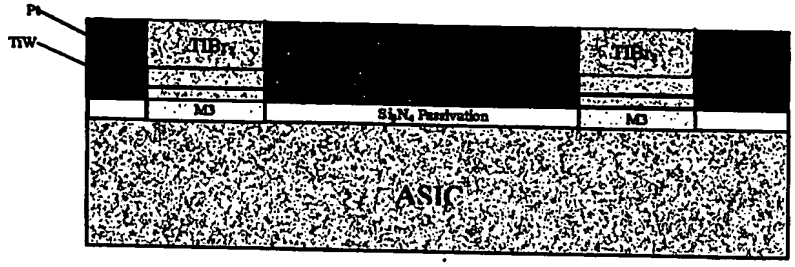

Fig. L

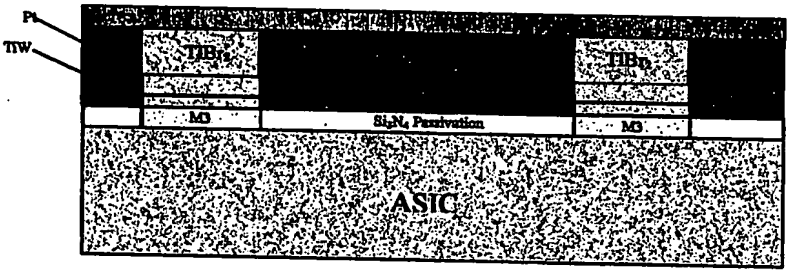

Fig. M

Drawing exhibits the generic structure of the detector recording layer and a diagrammatic representation of the cell structure.